

Direct Displacement-Based Design Procedure for Performance-Based Seismic Design of Structures

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Abstract : Since the seismic damageability of structures is controlled by the inelastic deformation capacities of structural elements, seismic design of structure based on force analogy methods is not appropriate. In recent year, the basic approach of design codes have been changed from force-based approach to displacement-based. In this regard, a Direct Displacement-Based Design (DDBD) and a Performance-Based Plastic Design (PBD) method are proposed. In this study, the efficiency of these two methods on seismic performance of structures is evaluated through a sample 12-story reinforced concrete moment frame. The building is designed separately based on the DDBD and the PBD methods. Once again the structure is designed by the traditional force analogy method according to the FEMA P695 regulation. Different design method results in different structural elements. Seismic performance of these three structures is evaluated through nonlinear static and nonlinear dynamic analysis. The results show that the displacement-based design methods accommodate the intended performance objectives better than the traditional force analogy method.

Keywords : direct performance-based design, ductility demands, inelastic seismic performance, yield mechanism

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